

REMARKS

I. Introduction

Claims 6-12 are currently pending in the present application. In view of the following remarks, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration of the present application is respectfully requested.

II. Claim Rejections

Claims 6-10 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ziegler (Corporate Research & Development) in view of U.S. Patent 4,890,160 ("Thomas") and U.S. Patent 5,347,599 ("Yamashita"). Applicants respectfully submit that the rejection should be withdrawn for at least the following reasons.

In rejecting a claim under 35 U.S.C. § 103(a), the Examiner bears the initial burden of presenting a prima facie case of obviousness. In re Rijckaert, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish prima facie obviousness, three criteria must be satisfied. First, there must be some suggestion or motivation to modify or combine reference teachings. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the claimed combination must be found in the prior art and not based on the application disclosure. In re Vaeck, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). Second, there must be a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Third, the prior art reference(s) must teach or suggest all of the claim limitations. In re Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). In addition, not only must the cited references teach or suggest each element of the claim, but the prior art must also suggest the desirability of combining the elements in the manner contemplated by the claim. M.P.E.P. § 2143.01 (citing In re Mills, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990)). The mere fact that references can be combined or modified does not render the resultant combination obvious

unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990).

Claim 6 recites a method for generating an image signal when estimating a motion of image sequences, the method including the step of “starting out from the first motion vector, in a second search step, determining a second motion vector with a sub-pel accuracy by an aliasing-reducing interpolation filtering, using a digital filter, a resolution being selected to be higher than that corresponding to a resolution of a pixel raster in the first search step, more than four neighboring pixels being utilized for an interpolation of each pixel, to interpolate pixels between a scanning raster for the first search step.”

In support of the rejection, the Examiner cites Thomas for teaching “motion vector detecting method comprising aliasing reducing interpolation filtering (col. 9, lines 25-55),” and Yamashita for teaching “an adaptive interpolation method comprising a concept wherein more than four neighboring pixels being utilized for an interpolation of each pixel (col. 4, lines 33-49).” The Examiner then summarily concludes that “it would have been obvious . . . to incorporate the concepts as . . . taught by Thomas and Yamashita et al. so as to utilize the aliasing reducing interpolation filtering, and to utilize more than four neighboring pixels for an interpolation of each pixel in order to reduce the effects of noise.” (Office Action, p. 3). Applicants respectfully submit that the Examiner’s obviousness conclusion is unsupported by the actual teachings of the applied references, which are discussed in detail below.

Initially, Applicants note that the state of the art for sub-pixel motion-estimation interpolation at the time the present invention was made was bi-linear filtering, and the motion vector resolution was restricted to ½ pixel (see, e.g., Bernd Girod, “The Efficiency of Motion-Compensating Prediction for Hybrid Coding of Video Sequences,” IEEE Journal, on special aliasing-reducing interpolation filters for sub-pixel accuracy). At the time of

the present invention, the general assessment of the scientific community was that the bit rate cost for raising the motion vector accuracy below $\frac{1}{2}$ pixel would not be justified by the gains to be made by a more accurate motion prediction. Applicants note that the combination of Ziegler, Thomas and Yamashita does not represent any improvement over the above-described state of the art for **sub-pixel motion-estimation interpolation** at the time the present invention was made.

With respect to the teachings of Ziegler, Applicants note that Ziegler merely teaches the process of estimating motion vectors with increased resolution, but Ziegler does not teach how to derive the values needed for interpolation. The secondary Thomas reference teaches interpolation filtering (there is no explicit mention of aliasing reduction in Thomas) only for the so-called "error surface" which resides in the frequency domain (a representation of the image after a 2-dimensional FFT, see col. 1, lines 49-50), but Thomas does not teach this interpolation filtering for the spatial domain, where the motion compensation itself takes place. Furthermore, while Yamashita teaches an adaptive interpolation method with more than four neighboring pixels, Yamashita merely applies this method to the up-sampling of static images and scan-like interpolation, and **Yamashita does not teach or suggest the use of the method for video sequences, let alone motion estimation for video sequences**. In view of the above-noted disclosures of the applied prior art, it is simply unreasonable to assert that the combined teachings of Ziegler, Thomas and Yamashita would suggest the present claimed method for generating an image signal when estimating a motion of image sequences, the method including the step of "starting out from the first motion vector, in a second search step, determining a second motion vector with a sub-pel accuracy by an aliasing-reducing interpolation filtering, using a digital filter, a resolution being selected to be higher than that corresponding to a resolution of a pixel raster in the first search step, more than four neighboring pixels being utilized for an interpolation of each pixel, to interpolate pixels between a scanning raster for the first search step."

It also respectfully submitted that the Examiner's asserted suggestion to combine Ziegler, Thomas and Yamashita is plainly based on nothing more than hindsight reasoning that is unsupported by the actual disclosures of the applied references. In this regard, the Examiner's assertion that "it would have been obvious . . . to incorporate the concepts as . . . taught by Thomas and Yamashita et al. so as to utilize the aliasing reducing interpolation filtering, and to utilize more than four neighboring pixels for an interpolation of each pixel in order to reduce the effects of noise" simply states what the sum of the selected individual disclosures of Ziegler, Thomas and Yamashita is, but the Examiner provides no explanation why a person skilled in the art would have been motivated at the time, without knowledge of Applicants' invention, to make the specific modification suggested by the Examiner in order to reduce the effects of noise. Applicants note that the Examiner's argument amounts to nothing more than that the teachings of Ziegler, Thomas and Yamashita may be selectively combined, and therefore one of ordinary skill in the art would selectively combine the teachings. However, such argument is a classic example of an "obvious-to-try" rationale, which is insufficient to support a prima facie obviousness: the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990).

With respect to the subjective "obvious to try" standard, the cases of In re Fine, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988), and In re Jones, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992), clearly indicate that the Examiner's generalized assertions that it would have been obvious to combine or modify the references relied upon do not properly support an obviousness rejection. In particular, the Court in the case of In re Fine stated that:

Instead, the Examiner relies on hindsight in reaching his obviousness determination. . . . One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

In re Fine, 5 U.S.P.Q.2d at 1600 (citations omitted; emphasis added).

Likewise, the Court in the case of In re Jones stated that:

Before the PTO may combine the disclosures of two or more prior art references in order to establish prima facie obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. . . . Conspicuously missing from this record is any evidence, other than the PTO's speculation (if it be called evidence) that one of ordinary skill . . . would have been motivated to make the modifications . . . necessary to arrive at the claimed [invention].

In re Jones, 21 U.S.P.Q.2d at 1943 & 1944 (citations omitted).

Applicants note that the Examiner has offered no evidence whatsoever of actual suggestion in the applied prior art to make the asserted modification, but only conclusory hindsight, reconstruction and speculation, which the Court of Appeals for the Federal Circuit has indicated does not constitute evidence that will support a proper obviousness finding.

For the foregoing reasons it is respectfully submitted that claim 6 and its dependent claims 7-10 and 12 are not rendered obvious by the combination of Ziegler, Thomas and Yamashita, and that the obviousness rejection of claims 6-10 and 12 should be withdrawn.

Independent of the above, specifically regarding claim 8, Applicants note that the Examiner's "official notice" is simply incorrect: the use of bilinear interpolation in combination with aliasing reducing interpolation filtering according to the present claimed invention, and thus enabling an easy-to-implement separable two-step filter kernel, is not used to generate ½ pixel precision (as asserted by the Examiner), but ¼ pixel precision. Applicants respectfully note that the claimed invention had not been taught or suggested by the state-of-the-art interpolation techniques at the time of the present invention.

Independent of the above, specifically regarding the Examiner's "official notice" concerning claim 9 and 10, Applicants note that the "choice" of the specific filter coefficients provided in the patent application is important for the effect of aliasing reduction, and thus exceed being a "simple design choice" alleged by the Examiner.

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Ziegler, Thomas and Yamashita, and further in view of U.S. Patent No. 5,991,447 ("Eifrig"). Applicants respectfully submit that the rejection should be withdrawn for at least the following reasons.

In rejecting a claim under 35 U.S.C. § 103(a), the Examiner bears the initial burden of presenting a prima facie case of obviousness. In re Rijckaert, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish prima facie obviousness, three criteria must be satisfied. First, there must be some suggestion or motivation to modify or combine reference teachings. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the claimed combination must be found in the prior art and not based on the application disclosure. In re Vaeck, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). Second, there must be a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Third, the prior art reference(s) must teach or suggest all of the claim limitations. In re Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). In addition, not only must the cited references teach or suggest each element of the claim, but the prior art must also suggest the desirability of combining the elements in the manner contemplated by the claim. M.P.E.P. § 2143.01 (citing In re Mills, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990)).

In support of the rejection, the Examiner cites Eifrig as teaching "predicting video objects separately (Abs.), and inserting coefficients into a transmission bit stream (140) at a beginning." Without passing judgment on the merits of the Examiner's assertions, Applicants note that claim 11

depends on claim 6, and that the teachings of Eifrig does not remedy the deficiencies of the combination of Ziegler, Thomas and Yamashita as applied against parent claim 6. Accordingly, Applicants submit that claim 11 is allowable over the combination of Ziegler, Thomas, Yamashita and Eifrig.


For the foregoing reasons, the obviousness rejection of claim 11 should be withdrawn.

III. Conclusion

In light of the foregoing, it is respectfully submitted that all pending claims 6-12 are in condition for allowance. Prompt reconsideration and allowance of the present application are therefore earnestly solicited.

Respectfully submitted,

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